

lead to the conclusion, that the obstructing cause is not of a permanent organic character. Peritonitis is not necessarily present in fatal cases of obstruction of the bowels, nor when present, is it the sole cause of death, which is perhaps chiefly to be attributed to the exhaustion produced by frequent vomiting, &c. Dr. G. has met cases of fatal obstruction, in which there was scarcely a trace of peritonitis.—*Dublin Medical Press*, April 20, 1842.

OPHTHALMOLOGY.

60. *On certain structures in the Orbit, and an improved method of treating its Diseases.* By J. M. FERRALL, Esq.—One of the most interesting papers which have lately appeared in the British Journals, is this by Mr. Ferrall. It places in a new light some most interesting appendages of the eye, and enables us to treat some of its diseases with more confidence than we have hitherto been able to do. In the year 1835, Mr. Ferrall was called to see a patient labouring under a most painful affection of the eye. He had been without sleep for more than forty-eight hours. The pain was in the ball of the eye, forehead, and temple, and of a most racking and intense kind. The eye evidently projected three quarters of an inch beyond its fellow; the lids were swollen and œdematous, and of a dusky red colour. The conjunctiva of the globe was protruded all round the cornea in the manner of chemosis, but its colour was not red nor vascular; it had a pale amber colour and manifestly was distended by serous infiltration. The cornea and iris were perfectly healthy.

Bleeding and other severe antiphlogistic treatment greatly relieved for a time, but he was not permanently relieved till the system had been affected with calomel.

Now, what was this affection? The eye was perfectly healthy, the disease was evidently in the appendages. There was neither corneitis, scleritis, iritis, nor retinitis. At first sight it seemed like periostitis, but one difficulty presented itself to this explanation; when the upper third of the superior eyelid was pressed in such a manner that the pressure was directed backwards towards the apex of the orbit, the sufferings were greatly increased; but when it was directed upwards towards the periosteal covering of the roof of the orbit, the patient did not complain. Besides, periostitis would hardly produce this projection of the eye. On account of the difficulty of coming to a just conclusion on the nature of this case, Mr. Ferrall resolved to examine the anatomy of the eyeball more minutely. He found that a distinct sheath existed around the globe, which protected it from the unnecessary action of the muscles, and also assisted the muscles in their offices; and it was evidently this sheath, which he names the *Tunica Vaginalis Oculi*, which was affected in the foregoing case. He says:

“Having separated the divided conjunctiva, we expose, not as has been described by anatomists, a cushion of adipose tissue, but a distinct tunic of a yellowish white colour, and fibrous consistence, continuous in front with the posterior margin of the tarsal cartilage, and extending backwards to the bottom or apex of the orbit, where its consistence becomes less strongly marked. By proceeding in the manner I have mentioned, the parts are displayed without any elaborate dissection. The sharp end of a probe, or director, will be sufficient to separate the ball of the eye from the new organ, by breaking gently the fine cellular tissue which connects them. Its colour is totally different from that belonging to its external surface, and it is here perfectly smooth, where the eye glides over it in its movements. The muscular substance of the recti muscles is nowhere visible, they lie on the outside of this tunic, which insulates and protects the eye in the most perfect manner.

“The most beautiful portion of this mechanism, however, remains to be described. In the concavity of this tunic, and about half an inch posterior to its anterior or orbital margin, are to be found six well defined openings, through which the tendons of the vessels emerge in passing to their insertion in the

sclerotic coat, and over which they play, as over pulleys, in their course. The tendons are loosely connected to the edges of those apertures by fine cellular tissue, which opposes no obstacle to their gliding movements.

"The physiology of this tunic, which I have ventured to term the *tunica vaginalis oculi*, will be conveniently considered in relation to each of its separate offices, namely, as an investment and protector of the globe of the eye, and as regulating the direction in which the muscles of the eye are to exert their force. In either of those capacities, this new and beautiful apparatus (independent of its pathological importance) appears to possess a physiological interest, entitling it to a high place among the many evidences of design, with which the animal frame abounds.

"The uses of this tunic, as a covering, will be obvious from a brief consideration of the inconveniences to which, without this protection, the eye would be subjected during the action of its muscles. These muscles, it has been invariably taught, were in close contact with the globe of the eye, on their passage to their insertion, the interspaces being occupied by the fat of the orbit. This description of the parts, which is to be found in the works of the best authors, implies, that during the frequent action of its muscles, the eye must sustain a pressure as great and as suddenly applied, as the movements of the organ are rapid and energetic.

"Now, according to the received anatomy of the orbit, the globe of the eye is grasped by the recti muscles in such a manner, that they must, during their action, exert upon it a sudden pressure analogous to that described by Sir Charles Bell. And when we consider, that between their origin and insertion they include the most prominent portion of the eyeball, it is obvious that the sudden swelling of their bellies during their action, (proverbially known to be as quick as thought,) must have produced a flash of light, if no protective partition had existed between them. *The use, then, of this tunic as a covering appears to be, to separate the eyeball from its muscles, and to protect it from pressure during their action.*"

Another office of this *tunica vaginalis oculi* is to assist the muscles by means of the openings through it, acting like so many pulleys, and thereby enabling the recti muscles to act with more power and rapidity in the different motions of the eye; and at the same time it prevents these muscles from retracting the eye—for "certainly if this tunic had no existence, it would be difficult to imagine how the recti muscles could communicate the rotatory movements to the eye without in a greater degree exerting a retracting power." The human eye has never been seen to be retracted, but *why* has never been explained before. Retraction takes place in many of the lower animals by means of an especial muscle—the retractor muscle; but this is fixed into the globe at its *posterior part*, near the entrance of the optic nerve, and cannot therefore exercise any injurious pressure on the globe. This *tunica vaginalis oculi* having been discovered, we are better able to understand some hitherto inexplicable diseases. The following case illustrates what Mr. Ferrall calls "Rheumatic inflammation of the *tunica vaginalis oculi*," with protrusion of the eye.

"Laurence Grant, æt. 32, a carpenter, of dark complexion, and rather strong constitution, presented himself at St. Vincent's Hospital, in February, 1838, on account of violent inflammation and protrusion of the right eye. The globe of the eye projected considerably beyond its natural situation; the cornea and iris were healthy in appearance, but vision was much confused. The conjunctiva projected remarkably around the cornea, but its colour was pale amber, and without any trace of vascularity. The eyelids were both swollen and red; the lower part of the upper lid was so much tumefied, that the ciliæ appeared to grow at an unusual distance from each other; and its transverse diameter was considerably increased. The colour of the lid was of a dusky red, and its surface was marked by a number of distended veins. Although the swelling of the palpebra had increased its vertical diameter, and caused it to descend, the protrusion of the eyeball was so great as to cause it to be uncovered. From the superciliary ridge to the inflamed portion of the eyelid, an interval could be

seen, where neither redness nor swelling existed. This space was about half an inch broad, and extended the whole length of the lid transversely.

"He complained of agonizing pain in the ball of the eye, and felt as if it were 'dragged out of the socket.' This latter sensation he described as never ceasing; but the pain was liable to severe exacerbations. He seemed to derive some comfort from keeping the palm of his hand pressed moderately against the whole tumour, although he could not bear the finger of another to be laid upon it. The upper portion of the superior palpebra, which was free from redness, could however bear pressure, provided it was not made suddenly, or so as to shake the whole lid, and that the pressure was directed upwards towards the roof of the orbit. When asked, he admitted that he perceived an occasional flash of light before his eye; but this appearance was more frequent in the beginning of the attack. It was now five days since the complaint commenced. He went to bed free from pain in the eye, and was disturbed about three o'clock in the morning. He had been unable to work for the last week from rheumatism in his knees and legs; the limbs were improving at the period of the recent attack. He had rubbed the parts affected with turpentine, but had used no internal remedy. There was still remaining slight fulness from effusion into the capsule of the left knee-joint, and tenderness with tumefaction about the middle of the right tibia.

"This man had suffered severely from syphilis six years before, and had used mercury largely. He was now married, but his habits of intemperance, as regarded the use of ardent spirits, were little altered.

"The temporal artery was opened, and sixteen ounces of blood removed, with relief. The improvement however was transient, and the pain returned almost immediately. The hospital being quite full at the time, and his lodging near, and not uncomfortable, he was allowed to take his medicine at home. Calomel and opium, three grains of the former, and half a grain of the latter, were administered every third hour.

"There was very little amendment until the constitutional effects of the remedy were established. This happened on the fourth day, when the disease began to give way. The pain first diminished, the eye then receded, and the redness gradually disappeared. The tumid condition of the palpebra, and the distorted appearance of the eyelashes, were the last to yield. When the disease in the orbit was removed, it was found that the tenderness and swelling of the knee and tibia were also gone."

The following case illustrates rheumatic inflammation of the tunica vaginalis oculi, protrusion of both eyes consecutively, and cure by hydriodate of potass:

"Mary Smyth, ætat. 48, was admitted into Joseph's ward, April 16, 1840, on account of rheumatism, with effusion into the capsules of both knee-joints. She was a fat, unwieldy person, and was rendered quite helpless by the synovitis, although enjoying tolerable health before the attack. No other joint was affected, and she was free from fever. Some degree of restlessness attended the pain; and the renal secretion was scanty and high coloured. Fomentations were employed after the application of leeches, and colchicum administered internally. At the end of a week, and when the swelling was nearly gone, she complained of acute pain in the right eye. There was no appearance of inflammation during the first twenty-four hours, and it consequently attracted little attention, except that an active cathartic was exhibited. On the second day, the upper eyelid was inflamed and swollen, and the ball of the eye was observed to project a little; the pain was increased, and she was annoyed by occasional flashes of light before the eye. Blood was taken from the temple by cupping, and antimonials with purgatives were prescribed. She passed a wretched night, suffering great agony; and the next day, the phenomena of the disease were fully developed. The eyeball projected three quarters of an inch; the cornea and iris were healthy, and looked brilliantly clear in the midst of a very prominent chemosis. The colour of the latter was a yellow amber, without any vascularity or redness. The lids were swollen but did not cover the eye: the upper lid presented the dusky-red colour and tumid appearance described in the last case.

The superior portion of its surface, or that next the superciliary ridge, did not participate in this change, and the two portions were separated by a very abrupt line of demarcation. Pressure on the upper division, when directed upwards towards the roof of the orbit, produced no pain. She could see as distinctly with the affected eye as with the other. The resemblance to the other cases was too striking to be overlooked; and as it was obviously not an affection of the periosteum of the orbit, and yet was connected with rheumatism, there could be little hesitation in making a diagnosis. I was desirous to know whether any other fibrous tissue was engaged, and therefore requested Mr. M'Sweeney, the gentleman who noted the case, to uncover the tibia. Here, although she had not noticed it to us, we found distinct swelling, and great tenderness over the left tibia, about an inch below its upper end. She then admitted that it gave her considerable pain, but her sufferings in the eye were so much greater, that she disregarded it altogether.

"Being at this time satisfied, from researches* already published, of the superior efficacy of the hydriodate of potass in periostitis, I determined to trust to it alone in combating this formidable disease; but as the organ of vision was in danger, I directed that this powerful salt should be administered at shorter intervals than usual. Ten grains were given every third hour.

"At visiting hour next day, she had taken seventy grains of the hydriodate. She declared herself better, and suffered much less pain, but we could not perceive much difference in the eye. On the day following, however, every person who saw her was struck with the improvement: the whole tumour was greatly reduced; the ball of the eye had receded considerably; the chemosis was lessened, and the swelling as well as redness of the lids was diminished. On the fifth day from the commencement of the treatment, there was hardly any trace of the complaint, and the medicine was therefore discontinued. The tibia had now also recovered its healthy state, when, just as we congratulated ourselves on the rapid subsidence of so severe an affection, the left eye became the seat of pain, and in thirty-six hours presented all the symptoms of the disease. The same protrusion of the eyeball, the same chemosis and swelling of the palpebræ, and, as in the previous attack, the same integrity of vision and intolerance of light. The hydriodate of potass was resumed in doses of fifteen grains every third hour, with a resolve to persist in its use (if it succeeded) for some days after the disease appeared to be removed.

"On the day following, I had the satisfaction to perceive that the symptoms had received a check; and in three days more, to find them altogether nearly removed. The hydriodate was continued in diminished doses, and gradually lengthened intervals, for ten days after every symptom had disappeared.

"Protrusion of the eyeball, which, when attempted to be explained by uncomplicated periostitis, requires some stretch of imagination, appears a very simple and inevitable result of inflammation of the tunica vaginalis oculi. There are here no soft parts to receive and divide the pressure, or protect the globe. The tunic is supported by other fibrous layers on its outside, as well as by the muscles of which they constitute the sheaths. Inflammation of this capsule must then be immediately followed by pressure; and when we recollect its conical form, and that, as happens in the case of inflammation of other fibrous tissues, effusion at once takes place into the cellular membrane connecting it to the ball of the eye, we perceive there is nothing to prevent the dislocation of the latter.

"This effusion into the cellular tissue will make itself evident in another way. The conjunctiva at the place where it forms the fold, in being reflected from the eyelid to the eye, closes up the tunica vaginalis in front. At this point it will not only receive the pressure of the effused serum, but will become separated from its connection with the sclerotic coat, by the extension of the infiltration; hence the amber coloured chemosis without vascularity of the conjunctiva. Chemosis originating in conjunctivitis always presents, in addition to serous infiltration beneath, one or other of the forms of hyperæmia. The chemosis of

* *Medical Gazette*, April 10, 1840.

which we treat is, in uncomplicated cases, the consequence of effusion from a deeper source. I can easily imagine the extension of inflammation from the fibrous structures of the lid, to its conjunctival surface, and thence to the sclerotic conjunctiva; but this complication did not occur in the cases which I have related.

"In distinguishing those cases, I would not be supposed to mean, that inflammation of this tunic is a disease apart, and never combined with a similar condition of the periosteum or cellular tissue, on the one hand, or inflammation of the eyeball itself, on the other. I am aware they may exist together, for I have seen such cases. All I mean to assert is, that inflammation of the tunic described, may be the primary affection, and the point of departure from which the diseased action may spread to the other fibrous layers in the orbit, and finally reach the periosteum; and that the attack may even be limited to the tunica vaginalis oculi—that it may here produce a train of symptoms of the most dangerous kind, and which have been hitherto supposed to reside in the periosteum, because the existence of other fibrous membranes in the cavity was not suspected."

Mr. Ferrall shows the value of being acquainted with the anatomical structure he has described, in other cases, such as "adhesion of the tunica vaginalis to the globe of the eye from inflammation," "abscess between the tunic and the globe," "tumours within the tunica vaginalis oculi;" and lastly in the "extirpation of the globe." Respecting this last operation he makes the following valuable remarks.

"The comparative safety of an operation limited by this fibrous tunic is obvious, but an additional recommendation will be, the facility of its performance. The conjunctiva being freely divided, the six tendons may be snipped across with a scissors one after another, where they emerge from the tunic. The eyeball will then be easily detached by a probe or director passed freely around it; when one step alone would remain—the division of the optic nerve. When we recollect that the roof of the orbit is occasionally found to be as thin as paper in some parts, it will appear most desirable to avoid stripping it of its coverings, by operating within this second orbit, or proper fibrous socket of the eye."

Mr. Ferrall ends his interesting paper by the following summary.

"The reflections suggested by a review of the cases which led to the present inquiry, as well as of this new and curious mechanism itself, may be reduced to the following propositions:—

1st. That the description of anatomists, which places the globe of the eye in contact with the fat and muscles of the orbit, is erroneous.

2d. That there exists a fibrous tunic, investing and insulating the eyeball, and separating it from all the other structures in the orbit.

3d. That the uses of this tunica vaginalis oculi are, to present a smooth surface, facilitating the movements of the eye; and by its density and tension, to protect it from the pressure incidental to the swelling of its muscles during their action.

4th. That the openings in this tunic perform the office of pulleys, giving a proper direction to the force exerted by the muscles,—securing the motions of rotation, and opposing those of retraction, which would otherwise predominate.

5th. That certain cases of disease within the orbit, accompanied by protrusion of the eyeball, are to be explained, only by reference to the tunica vaginalis oculi, and the other fibrous tissues now described.

6th. That a correct knowledge of the anatomy of the orbit and of the fibrous structures alluded to, is essential to the operating surgeon, in dealing with abscesses and tumours, in extirpation of the eyeball, in the operation for strabismus, and all operations on that cavity."—*Braithwaite's Retrospect*, No IV, from *Dublin Journ. Med. Sci.* July 1841.

61. *Rupture of the Sclerotica by a blow with the Fist.*—John Hays, aged 39, was admitted into Middlesex Hospital, under Mr. Arnott, Oct. 4th, 1841. This